class is urged most strongly in an appendix to this Circular, as being far more dangerous in the United States, where custom exerts no check. Since the danger is equal to the whole Union, while the burden of meeting it falls so heavily on certain States, it is again strongly urged that a part of the expense should be met by national taxation.

THE writer of the second Circular of Information published this year by the United States Bureau of Education trusts that the Shorthand Society of London will throw light upon the history of their art, as the material is quite inaccessible to the American student. Yet his industrious researches there enable him, after speaking of the shorthand invented by Cicero's freedman, and of its revival by Dr. Timothe Bright in Queen Elizabeth's time, to append the names and dates of more than 400 authors of English systems; a catalogue, 100 pages long, of writers and their works on the subject, and 112 alphabets of various dates, from 1602 to 1882. He is able also to quote thirteen monthly publications in the United States and Canada on this subject. It is to be hoped that, in this art as in nature, the result will be the survival of the fittest (Mr. J. Pitman's system already counts its 810th thousand of copies issued), and one is inclined to wonder whether some full and skilful system of denoting sounds might not be worked out, which would render unnecessary the more partial working of phonetic spelling.

THE culture of the tea-tree in Transcaucasia, which has been recently advocated by Dr. Woeikoff, has already been successfully carried out on a small scale for several years—as we learn from a recent communication of M. Zeidlitz to a Russian newspaper. It was an Englishman, Mr. Marr, who has inhabited Transcaucasia since 1822, who brought to a flourishing state the Crown garden at Ozurghety, and embellished it with a number of lemon, orange, and tea trees, these last numbering more than two hundred. After the Crimean war only twenty-five tea-trees were growing in this garden, and according to Mr. Marr's advice they were transplanted to a private estate at Gora, close to Tchakhataour. Since the estate has changed its proprietor, only two tea-trees have remained, but still they continue every year to flower and to give fruit, and M. Zeidlitz is sure that if the culture be seriously tried it might be successful in the valleys of the Koura and Rion.

THE additions to the Zoological Society's Gardens during the past week include a Ring-tailed Coati (*Nasua rufa* ♂) from South America, presented by Miss K. M. Battam; two Patagonian Cavies (*Dolichotis patachonica*) from Patagonia, a Hairy-rumped Agouti (*Dasyprocta prymnolopha*) from Guiana, a Ring-tailed Coati (*Nasua rufa*) from South America, two Rufous Tinamous (*Rhynchotus rufescens*) from Brazil, two Tuberculated Iguanas (*Iguana tuberculata*) from the West Indies, two Huanacos (*Lama huanacos* ♂ ♀) from Bolivia, presented by Mr. Frank Parish, C.M.Z.S.; a Gray Parrot (*Psittacus erithacus*) from West Africa, presented by Mr. E. T. Holloway; a Vulpine Phalanger (*Phalangista vulpina*) from Australia, presented by Mr. H. Livermore; two Smooth Snakes (*Coronella lævis*), European, presented by Mr. W. H. B. Pain; a Two-streaked Python (*Python bivittatus*), a Reticulated Python (*Python reticulata*), a Two-banded Monitor (*Varanus salvator*), a Fringed Tree Gecko (*Ptychozoon homalocephala*), a Javan Porcupine (*Hystrix javanica*) from Java, presented by Dr. F. H. Bauer, C.M.Z.S.; two Mountain Ka-Kas (*Nestor notabilis*) from New Zealand, a Three-coloured Lory (*Lorius tricolor*) from New Guinea, a Severe Macaw (*Ara severa*) from Brazil, deposited; ten Common Chameleons (*Chameleon vulgaris*) from North Africa, two Brazilian Cariamas (*Cariama cristata*) from Brazil, purchased; a Somali Wild Ass (*Equus somalicus* ♂) from Somali Land, received in exchange.

OUR ASTRONOMICAL COLUMN

SCHMIDT'S VARIABLE-STAR IN VIRGO.—Prof. Schjellerup, writing from the Observatory, Copenhagen, on August 9, thus expresses himself with reference to a note which appeared in this column on his identification of the above object:—"On the article that is to be found in NATURE, July 31 last, about this star, allow me to make some essential remarks. The author entirely misconceives the sense of my note in Sûfi. It does not at all concern No. 19 Ptol., but only sets out that Lalande 25086 takes that place where must have been the star which Sûfi saw; and I may yet maintain the correctness of the note. I only ask the author to look at Bremicker's map, Hora XIII.; he will find there that Lalande 25086 has just equal distances from Spica and from *h* Virginis (Ptol. 17), and, what is more, that this distance is nearly one and a half times the distance between Spica and *h* Virginis, very conformably to Sûfi's remark in the text: 'Entre elle (19) et al-simâk (*a* Virginis) vers le sud-est, il y a environ une coudée et demie, et entre elle et la 17e il y a la même distance. Avec al-simâk et la 17e elle forme un triangle isoscèle, cette étoile étant au sommet.' It is also to be remarked that Sûfi has before declared the distance between No. 17 and Spica as 'environ une coudée,' that is, nearly 2° 20'. What is here said about 19 (Sûfi) does not at all agree with the position of No. 19 by Ptolemy, which is also pointed out by Sûfi himself as follows: 'La latitude de cette étoile, indiquée dans le livre de Ptolémée, se trouve erronée, parce que, au ciel, elle se fait voir autrement qu'elle ne tombe sur le globe.'" We are glad to print Prof. Schjellerup's explanation of the purport of his note; it is quite possible that others may have interpreted it as we did.

THE NEW COMET.—Several orbits for this comet have been published in the *Astronomische Nachrichten*, founded for the most part upon the position obtained on the night of discovery, July 16, and on M. Trépied's observations on July 23 and 29, where there appears to have been at first some doubt as to the comparison-star. The middle observation is not well represented by any of these parabolic orbits, and Prof. Weiss conjectures that there is considerable ellipticity, at the same time remarking that a certain general resemblance exists between the elements of the present comet and those of the lost short-period comet of De Vico, observed in 1844, but not found since that year. In the uncertainty which seems to have attached to the observations at Algiers, it would not be safe to speak confidently as to the nature of the orbit, though it may be decided in a very short time.

Prof. Tacchini has kindly communicated the following observation made at the Observatory of the Collegio Romano:—

	Rome M.T. h. m. s.	Right Ascension h. m. s.	Declination ° ′ ″
August 9, at	8 31 56 ...	16 51 20·14 ..	−36 56 25·5

The comet was very faint, and the observations, by Prof. Millosevich, are a little uncertain.

The best parabola, according to Prof. Weiss, has the following elements:—

Perihelion passage, August 17·5109 G.M.T.

	° ′ ″	
Longitude of perihelion	301 57 24	M.Eq. 1884·0
,, ascending node ...	357 45 51	
Inclination	7 2 31	
Logarithm of perihelion distance	0·147982	

Motion—direct.

The most reliable elements of De Vico's comet of 1844 are those given by Brünnow in the Ann Arbor *Astronomical Notices*.

BRORSEN'S COMET.—From a note of Prof. Krueger's in the *Astronomische Nachrichten*, it seems that Dr. Schulze has not been able to undertake the calculation of the perturbations of this comet since its last appearance in 1879, and accordingly the rough ephemeris lately given in NATURE is transferred to that journal.

THE FORESTS OF NORTHERN EUROPE

A VERY recent report has appeared on this subject in the shape of a small Blue-Book which deals with the various aspects of the forestry question in certain of the more northerly States of Europe, such as Germany, Russia, Norway, Sweden, Coburg, and Gotha. The Report, which contains matter of great interest in many ways, is the outcome of the proposals of Dr. Lyon, M.P., to rehabilitate the ancient forest system in Ireland; and although the greater part of it deals with the

administrative and commercial results, in themselves of great value, many facts are elucidated which bear upon the natural history of the countries under discussion. The Duchy of Gotha contains a forest area of 32,054 hectares, of which at least 94 per cent. are massed together in the Thuringian Forest, whilst the remainder cover the height above the plains, at an elevation of about 900 metres above the sea. The geological formation of these heights is for the most part Lower New Red interspersed with thick veins of porphyry, while that on which the plain forests are situated is limestone. At least 85 per cent. of the Gotha trees are pine, the remainder consisting of larch, oak, maple, ash, birch, and elm. The Duchy of Coburg does not possess half the forest area of Gotha, there being only 15,718 hectares altogether, of which 86 per cent. is pine. Considering the minuteness of information which is gathered together by most of the German Departmental Bureaus, it is surprising how difficult it is to obtain statistical knowledge on the subject of forests, the reason being that each State has its own Department of Agriculture, quite irrespective of the Imperial Administration. Prussia, however, seems to have been more awake than the others, to the desirability of attempting to cultivate other than indigenous trees in the kingdom; and in the Budget for 1880, no less than 50,000 marks (2500*l.*) was set aside for the purpose. The following list was made out of new trees, but as there has not been any further mention of their introduction in subsequent Reports, it is uncertain how far the proposal was really carried out. The trees were as follows :—

Name	Habitat
Pinus rigida	North America, eastern portion.
Thuja gigantea	
Juglans nigra	
Carya alba	
C. amara	
C. aquatica	
C. tomentosa	
C. porcina	
Quercus rubra	
Populus monilifera	
Abies Douglasii	North America, western portion.
Pinus ponderosa	
Cupressus Lawsoniana	
Juniperus Virginiana	
Acer Negundo	
A. saccharinus	
A. dasycarpum	
Betula lenta	
Abies Nordmanniana	Caucasus.
Pinus Laricio	Southern Europe.
Picea sitchensis	Japan.

The estimated area of forest land in European Russia is about 146,460,000 dessiatines (1 dess. = 2·69 acres), or 33 per cent. of the total area of the country, compared with which Austria has 29 per cent., Germany 26, France 19, Italy 18, and Turkey 14. It is a drawback to Russia that her forests are so unevenly concentrated, at least three-fifths being situated in four Governments, leaving but two-fifths to the other forty-five. As a rule, the further one travels south in Russia the less forest is met with, the Governments of Archangel, Wolgoda, Olonetz, and Perm possessing 60 per cent., while in those of Poltawa, Bessarabia, and the country of the Don Cossacks, there is not more than 4 per cent. It is an undoubted fact that Russian timber is on the decrease; and ten years ago M. Aschakow in his evidence before a Commission to inquire into the condition of the forests in the Ufa, stated that the whole of that part of the country was threatened with an absolute want of wood, hundreds of thousands of trees being stripped for the sake of the bark and the roots. Naturally the evil does not stop here; but the climate also shows a considerable change—the rivers, such as the Bielaia, showing each year a smaller volume of water. Floods are more frequent, property is destroyed to an alarming extent, the beds of the rivers silt up, and the navigation becomes annually more and more uncertain. From observations made at Kieff, the winter lasts longer, and the harvests are not so productive as of yore; while Dr. Grimm notes that rivers which once had a reputation for abundance of fish, the banks of their rivers being well covered with timber, are now as deficient as formerly they were rich, and he attributes the change to the dearth of insects, whose larva furnish food for the fish. Another evil arising from the destruction of the forests is the much greater liability to hailstorms; and in this respect the same complaint comes from France, Germany, and Switzerland. Indeed, districts that were once wooded, rarely, if ever, suffered from hailstorms; and the converse has been noted that, where new trees have grown up, the storms have been less and less severe.

So general has been the conviction that this forest destruction is causing serious damage to the country, that a society has been formed at Moscow to consider the question, and engineers have been sent with a view of ascertaining the height of the water in the rivers during the spring, the changes in the number and size of the lakes, the changes which have taken place in the character of the summer and winter seasons, particularly as affecting the vegetation and the growth of plants. M. Wagner, in an article in the *Novoe Vremya*, 1882, considers that the systematic forest waste will lay Western Russia open to the action of the south-east wind, and thus bring undue dryness and contagion from Central Asia; and according to the latest accounts of the advance of the Siberian plague, M. Wagner's prognostications seem in a fair way of fulfilment.

The climatic conditions of Russia are such as to allow a great variety of trees to flourish. If a line be drawn from Orenburg towards the west, through the Governments of Samara, Pensa, and Tamboff, as far as Tula, and thence to Charkoff, Kieff, and Volhynia, the deciduous trees will be found to predominate to the south, and the coniferous trees to the north. As far as 67° N. lat. *Pinus sylvestris* is the most universal tree, being found in the south, indeed, only in isolated patches. It extends northwards as far as 70° N. lat., and eastwards as far as the Petchora, its southern boundary being at 44½°, though, passing over the steppes, it is again seen in the Caucasus at from 41½° to 43°. *Abies excelsa* is the next common, being found in Finland as far north as 68¾°, while in the east the predominating tree is *A. obovata*. *A. sibirica* extends to 64°, and not further south than Nijni Novgorod. The larch (*Larix europæa*) is only met with in Poland, though *L. sibirica* inhabits the Government of Olonetz, Nijni Novgorod, and the Ural as far as the river Sakmara (51¾°), and is in high repute for ship-building purposes. The cedar (*Pinus cembra*) extends north-east to 64½°, and also in the northern part of Orenburg to 51°. There are large forests of this pine in Perm and Volgoda, and an extensive trade is carried on in the exportation of cones. As to the deciduous trees, the birches (*Betula alba*, *B. pubescens*, *B. verrucosa*, *B. fruticosa*, and *B. nana*) are very general throughout Russia, being found on the Petchora in 67° N. lat., as well as in the Crimea and the Caucasus. The oaks (*Quercus pedunculata*) have the same range southward, but are not met with on the north further than St. Petersburgh and Southern Finland, and not at all east of the watershed of the Ural. The variety known as *Q. pedunculata tardiflora* grows in the Governments of Kieff, Poltava, Charkow, and Voronetz, and is the only oak that flourishes in the Crimea. *Q. robur* and the beech (*Fagus sylvatica*) have their homes in Poland, Podolia, Volhynia, Bessarabia, the Crimea, and the Caucasus. The aspen (*Populus tremula*) is found all over the land as far as 66°, and is a valuable industrial tree, being used in paper-making. The lime-tree also (*Tilia parvifolia*) is valuable in the bast manufactories and for making matting, and is found from 64° as far as Volgoda and Perm and in the Governments of Kostroma, Kazan, and Simbrisk. The red beech flourishes at heights varying from 1500 to 4000 feet above the sea-level, and, with the white beech (*Carpinus betulus*), is chiefly found in the south-west of the Empire, and also in the Caucasus and Crimea. There are large forests in the neighbourhood of Kieff and Poltava, entirely composed of this tree. The elms (*Ulmus effusa*, *U. campestris*, and *U. suberosa*) usually frequent the south, though not in profusion; but the ash (*Fraxinus excelsior*) is much more plentiful, and is particularly valuable, as affording shelter for the Spanish fly, the exporting of which is a somewhat extensive industry. The maples (*Acer platanoides* and *A. tataricum*) are tolerably plentiful in all parts, though not as forest trees. The same may be said of the alder (*Alnus incana*), the willow, wild apple, pear, and plum.

The average annual produce of the Russian forests is about 600,000,000 cubic feet, at which rate the yield of a dessiatine is not more than six cubic feet, a poor result when compared with other countries, Prussia giving at the rate of 84·7 cubic feet a year, Bavaria 131, and Saxony 165. It is singular, however, that where the extent of productive forest in Russia is smaller, the yield per dessiatine is greater, the average of the central provinces being 60 cubic feet, and in the south 37, while in the

north it scarcely amounts to 3 cubic feet. Nor is the return very satisfactory from a pecuniary point of view, most of the Governments being far under one rouble per dessiatine, though a few can show better results, those of Moscow, Kursk, and Voronetz being 3½ roubles, of Charkow 5½, Tula 6·16. But the general value is not as satisfactory as in other countries, Prussia showing an equivalent of 2½ roubles, Bavaria 4½, Saxony 10, and France 9. One of the most useful developments of tree cultivation in Russia has been the formation of plantations along the railway tracks, about 2000 dessiatines having been already covered in this way on the Kursk-Charkoff-Azov, the Kozloff-Voronetz-Rostoff, the Orel-Griasi and Fastovo lines, the object being of course the protecting of the rails from snowdrift. M. Sredinsky, the inventor of this very successful system, considers that seven rows of trees are sufficient for this purpose, and on this calculation one verst would require 33,000 plants, of which 9000 must be trees, and the remaining 24,000 shrubs. The trees which he finds best adapted for this purpose are elm, ash, oak, white and yellow acacia, maple, white thorn, hazel (*Corylus avellana*), wild plum, gleditschia, mulberry, elder, &c., but along the Sumi Railway in the Government of Charkoff, *Pinus sylvestris* has been planted, and does well. Tree-planting has also proved invaluable for fixing the sand plains at Aleschki on the Dnieper, the best for this purpose being *Salix acutifolia*, *Genista tinctoria*, *Ulex europæus*, *Prunus spinosa*, and *Pinus maritima*. When Russia first got possession of the Crimea, the banks of the Dnieper were wooded for at least seventy versts; but, as colonisation extended and population increased, the herds and flocks destroyed the roots of the trees, and thus allowed the formation of these sand plains, which comprise 139,000 dessiatines. Of these, some 20,000 are fairly covered with *Salix viminalis*. Birch are found on about 10,000 dessiatines, while at least 34,000 are of the pure sand.

THE AMERICAN INITIATIVE IN METHODS OF DEEP-SEA DREDGING[1]

THE published records respecting the use of dredges for natural history purposes carry us back to scarcely more than a century and a quarter ago, when Otho Frederick Müller, a prominent Danish naturalist, began his studies of the aquatic life inhabiting the coasts of Norway and Denmark below the shore-level. The dredge he used, a very simple affair, was, so far as we know, the first one ever devised for the special needs of the naturalist; and yet, with only a single important modification as to the shape of the frame, it has been handed down to our time as the most efficient appliance for the ordinary purposes of dredging.

As described and figured in 1779, it consisted of a plain, rectangular iron frame, with all four sides of equal length, and bevelled to sharp edges in front, forming the mouthpiece to a large and open net. Four handles extended forward from the angles, and met in a single ring for the attachment of the drag-rope. The principle defect of this dredge consisted in its very wide mouth, permitting the easy escape of specimens both while dragging and during the hauling in.

Although Müller's researches were confined to shallow water, apparently not exceeding a depth of thirty fathoms, they established a precedent for subsequent operations, and afforded proof of the value of submarine collecting.

This new field of exploration did not, however, begin to enlist the active services of working naturalists to any extent until about the third or fourth decade of the present century, since which time the interest in marine zoological research has rapidly increased, and our knowledge of the sea-bottom has been extended to the deepest-known areas. For the first thirty or forty years the improvement in methods of work scarcely kept pace with the progress of knowledge regarding the inhabitants of the sea; and it is only within the past fifteen years that the methods of deep-sea dredging have been at all perfected.

To Dr. Robert Ball of Dublin, who was afterwards associated with Prof. Edward Forbes in his memorable explorations, has generally been given the credit of having devised, about 1838, the improved form of naturalists' dredge, in nearly the same shape in which it is used to-day. However that may be, it was about the year last mentioned that both European and American naturalists entered actively into the study of the sea-bottom; and the history of their various exploits down to the present time affords an exceedingly interesting chapter, upon which the subject of our paper permits us to touch but slightly.

[1] From *Science*.

It may be well to remark, however, that the character and results of European, and especially British, exploration are much more widely and popularly known than are those of our own country. The reason is obvious. The active mercantile pursuits of a young and progressive people have naturally made them less appreciative of scientific facts and results than the inhabitants of many older countries, where business interests have fewer claims upon all classes. There has been but a slight demand for popular writings upon such an unpractical subject, and the plodding naturalist has generally been content to record his observations and methods where they were accessible only to his brother-workers. For this reason American naturalists have not received the credit which is their due, either at home or abroad; and much of the honour that justly belongs to them has passed into other hands.

So far as concerns the general public, this is not to be wondered at, when we consider that the only popular accounts of deep-sea dredging explorations obtainable in this country are of English origin. But the same excuse does not hold good for the working naturalists of any country, including our own; as the progress of American deep-sea research, and the improvements in methods for carrying it on, have in nearly all instances been duly and promptly recorded in the proper channels to insure wide and timely distribution.

Since the very beginning of activity in this branch of investigation, American workers have not been far behind those of any European country; and their record is as creditable. Dredging was carried on by the Wilkes U.S. Exploring Expedition during the early part of its cruise, beginning in 1838; and at about this same time a few of our most earnest naturalists were using the dredge at home. The late Dr. William Stimpson, one of the most intelligent observers in this branch, and whose name is closely linked with several important explorations, began his career in Boston Harbour between 1848 and 1850; his first instructions having been received from Dr. W. O. Ayres, who began dredging fully ten years before. Stimpson's researches were largely conducted under Government auspices; and the collection of submarine specimens resulting from his labours, distributed over many portions of the Atlantic and Pacific Oceans, was probably one of the very largest of its kind that had been made, up to the time of its unfortunate destruction by fire at Chicago, in 1871. The loss of these collections, and of all the voluminous manuscript reports treating of them, followed by the sad death of the author, has deprived our country of a most important chapter in the history of submarine exploration.

The sixth decade of this century, however, brought out many additional investigators, and a fresh impetus was given to the work, which has since been expanded and developed to such an extent as to establish beyond all question American precedence in the methods of deep-sea research at least, both as regards dredging and sounding.

From among the more energetic and successful of our modern dredgers may be mentioned Prof. A. E. Verrill of Yale College, whose dredging studies began in 1864, on the coast of Maine, and who, since the organisation of the U.S. Fish Commission, has been its main helper and adviser in all matters pertaining to submarine research, the special direction of the dredging operations having been intrusted to him from the beginning. His earlier experiences gave him a clear insight into the requirements of the new project, and enabled him to devise many valuable appliances, and improve upon those which had been in use. To his zealous and untiring efforts is due much of the perfection in present methods of work.

In 1867 Mr. L. F. de Pourtalès, of the U.S. Coast Survey, began the extensive series of deep-sea explorations off the southern coast of the United States, which were carried on for several years, and subsequently led to the eventful cruises of the steamer *Blake* between 1877 and 1880, resulting in an entire revolution in the methods of deep-sea dredging and sounding. The investigations of Mr. Pourtalès anticipated by a year those of the English steamers *Lightning* and *Porcupine*, which have been so widely described, and were preceded by only one series of systematic dredgings in equal depths of water—those of the Professors Sars, father and son, of Norway. But little credit for this fact has been received from naturalists abroad, the date of Mr. Pourtalès' first cruise being generally regarded by them as 1868, although his first paper, descriptive of the character of his work and of many new forms of deep-sea animals, appeared in